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U.S. Department
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PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF LIMITED
DISTRIBUTION NO. 75: SILVER Y MOTH

APHIS-PPQ

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APHIS 81-49
September 1986

Pest

SILVER Y MOTH
Autographa gamma (L.)

Other
Nomenclature

Plusia gamma (L.)
Phytometra gamma (L.)

Order: Family

Lepidoptera: Noctuidae

Economic
Importance

Larvae of the silver Y moth are pests of a wide range of vegetable crops in Europe. In some years, epidemics cause extensive damage (Carter 1984). In Czechoslovakia in 1961-62, defoliation of sugar beets in spring or summer decreased yields. During the entire larval stage, one larva consumes an average of 81 sq cm of leaf area. Because feeding lasts only a few days, the time for treatment is short (Novák 1975). In Yugoslavia, this pest caused significant damage in 1958 to tobacco seedlings (Vasilev and Todorovski 1974).

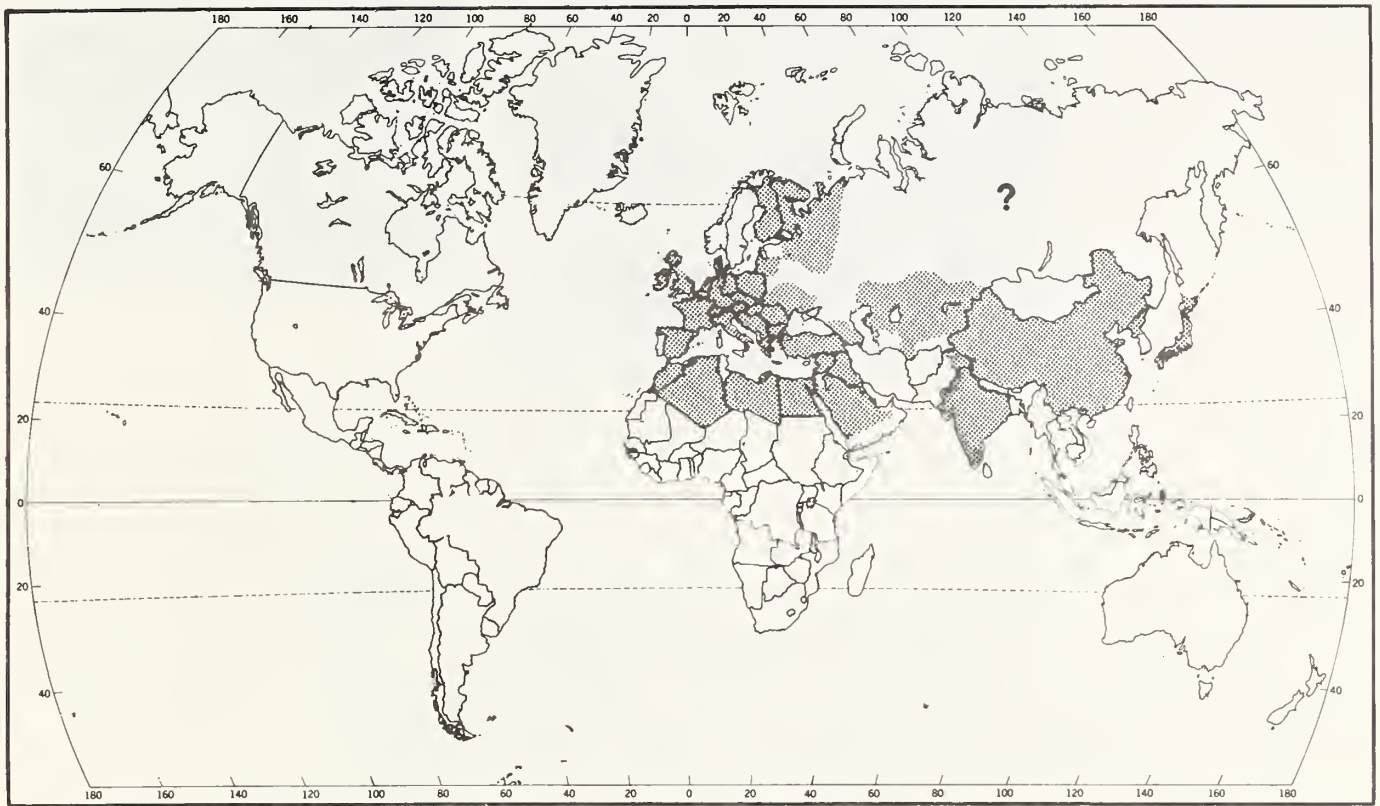
Hosts

Larvae can feed on at least 224 plant species including 100 weeds (Maceljski and Balarin 1972). The recorded host list includes Allium cepa (onion) (Carter 1984), Amaranthus retroflexus, Andropogon sp. (Dochkova 1972), Antirrhinum sp. (Becker 1974), Apium graveolens (Dochkova 1972), Beta vulgaris (beet root, sugar beet) (Carter 1984), Brassica napus (rape) (Bio-Entomological Station of the Zemstvo of the Government of Bessarabia at Kischinev 1913), Brassica oleracea (cauliflower) (Al-Adil et al. 1978), cabbage, savoy cabbage (Rahn 1983), Brassica rapa (Chinese cabbage) (Taylor 1984), Cannabis sativa (hemp) (U.S. Department of Agriculture 1970), Chenopodium album (lambsquarters) (Dochkova 1972), Chrysanthemum spp. (Carter 1984), Cicer arietinum (chickpea) (Sithanantham et al. 1984), Cirsium arvense (Canada thistle) (Dochkova 1972), Coleus spp. (Carter 1984), Conium maculatum (poison-hemlock) (Zacher 1921), Convolvulus arvensis (field bindweed) (Dochkova 1972), Datura spp. (Carter 1984), Daucus carota (carrot) (Oudinet 1978), Dianthus caryophyllus (carnation) (Becker 1974), Eruca vesicaria (garden rocket) (Harakly 1975), Gossypium hirsutum (cotton) (Kavut et al. 1974), Helianthus annuus (sunflower) (Dochkova 1972), Helianthus tuberosus (Jerusalem-artichoke) (Noel 1914), Lactuca sativa (lettuce) (Carter 1984), Lathyrus aphaca (yellow pea) (Dochkova 1972), Lathyrus odoratus (sweet pea) (d'Araújo e Silva et al. 1968), Linum usitatissimum (flax) (Zhuravlev et al. 1976), Lotus corniculatus (birdsfoot trefoil) (Dochkova 1972), Lycopersicon esculentum (tomato) (Perez Ibáñez et al. 1973), Malva neglecta (mallow) (Rashid et al. 1971),

Meconopsis sp. (Becker 1974), Medicago sativa (alfalfa) (Mateias 1983), Nicotiana tabacum (tobacco) (Vasilev and Todorovski 1974), Onobrychis viciifolia (Dochkova 1972), Pelargonium sp. (Becker 1974), Petroselinum crispum (parsley) (Dochkova 1972), Phaseolus vulgaris (garden bean) (Carter 1984), Pisum sativum (garden pea), Polygonum convolvulus (Dochkova 1972), Raphanus sativus (radish) (Harakly 1975), Rhododendron sp. (azalea) (Becker 1974), Rumex acetosa (sorrel), Setaria viridis (green foxtail), Sinapis arvensis (charlock), Solanum nigrum (black nightshade) (Dochkova 1972), Solanum tuberosum (potato) (Carter 1984), Sonchus arvensis (perennial sowthistle), Spinacia oleracea (spinach) (Dochkova 1972), Trifolium alexandrinum (Egyptian clover) (Harakly and Assem 1978), T. pratense (red clover), T. repens (white clover) (Dochkova 1972), Vigna unguiculata (cowpea) (Harakly 1975), and Zea mays (corn) (Carter 1984).

General Distribution

Most literature reports that this noctuid is widely distributed throughout all of Europe, and eastward through Asia to India and China. Recorded countries are in AFRICA - Algeria (Soldán and Spitzer 1983), Egypt (Harakly 1975), Libya (Turati and Zanon 1922), and Morocco (Mège 1923); ASIA - China (Carter 1984), India (U.S. Department of Agriculture 1970), Iraq (Al-Adil et al. 1978), Israel (Dunkelblum et al. 1982), Japan (Oku and Kobayashi 1978), North Korea (Ronkay 1982), Saudi Arabia (Food and Agriculture Organization 1972), Syria (Sithanantham et al. 1984), and Turkey (Kavut et al. 1974); EUROPE - Austria (Schreier 1966), Bulgaria (Dochkova 1972), Czechoslovakia (Novák 1975), Denmark (Thygesen 1968), East Germany (Krämer 1967), Finland, (Linnaniemi 1935), France (Oudinet 1978), Greece (Mentzelos et al. 1964), Hungary (Vojnits 1969), Ireland (Haynes and Hillis 1982), Italy (Rina and Paolo 1980/1981), Netherlands (de Lint and Leeuwenburgh 1967), Poland (Minkiewicz 1923), Romania (Mateias 1983), Spain (Perez Ibáñez et al. 1973), Switzerland (Arn et al. 1983), United Kingdom (Emmett 1980), and Yugoslavia (Vasilev and Todorovski 1974); and SOVIET UNION - Azerbaijan S.S.R. (Abdinbekova and Akhmedov 1971), Kazakh S.S.R. (Kozhanchikov 1937), Latvian S.S.R. (Ozols 1930), Lithuanian S.S.R. (Augustauskas 1977), Moldavian S.S.R. (Bio-Entomological Station of the Zemstvo of the Government of Bessarabia at Kischinev 1913), Leningrad, Russian S.F.S.R. (Kozhanchikov 1937) (including North Ossetian ASSR (Zhulidov et al. 1982)), Ukrainian S.S.R. (Klyuchko and Koval 1981), and Uzbek S.S.R. (Kashkarova and Khakhanov 1980).



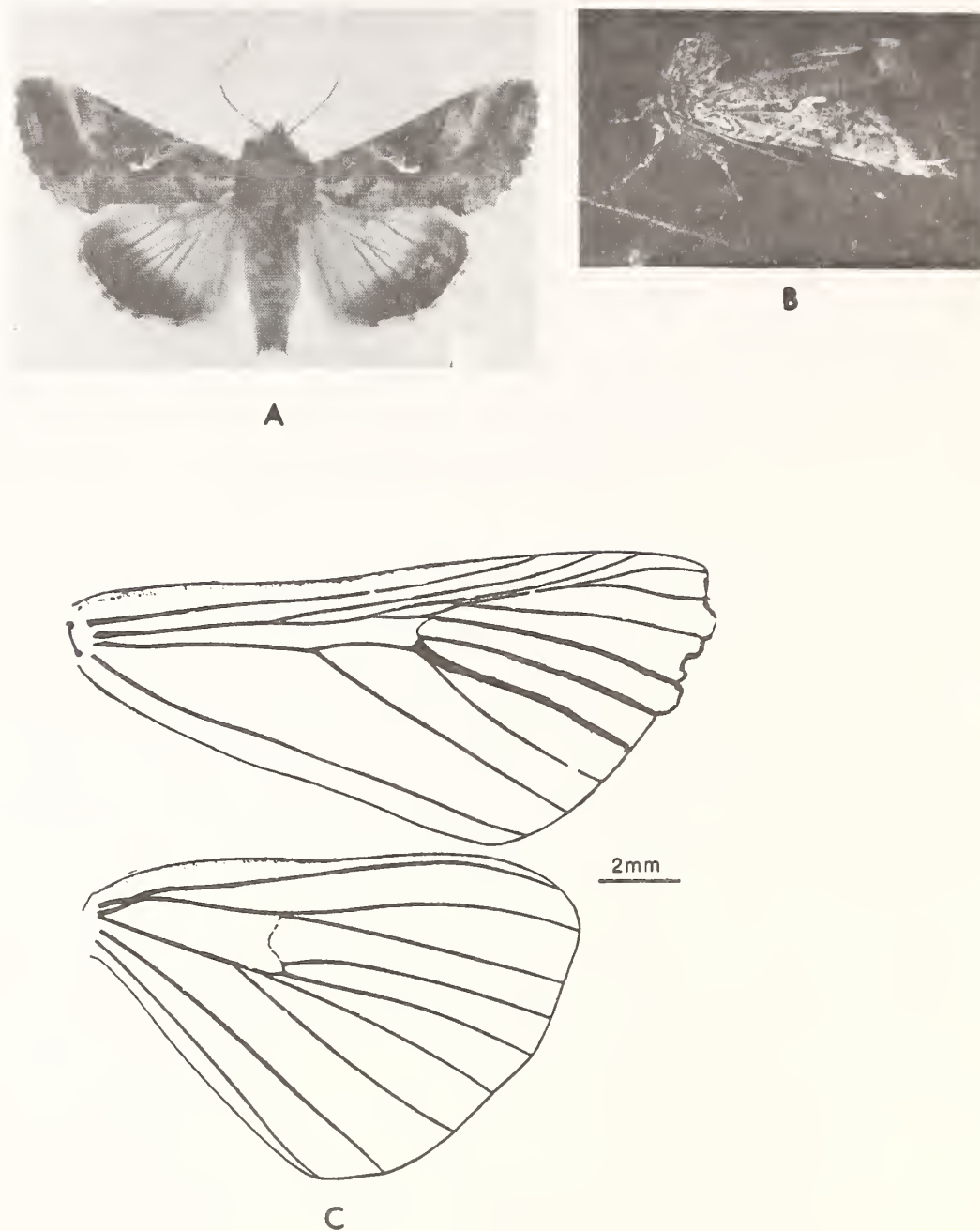
Autographa gamma distribution map (Prepared by Non-Regional Administrative Operations Office and Biological Assessment Support Staff, PPQ, APHIS, USDA).

Characters

ADULTS (Figs. 1 A-B) - Adult characters from Nazmi et al. (1984). Head vertex and frons with dense brownish gray erect hair. Eyes naked, large, obscure, densely lashed. Antennae filiform, brownish, about three-fourths length of forewing, scape lighter than shaft. Labial palpi strong, well developed, upturned with dense rough brownish scales. Proboscis developed, coiled.

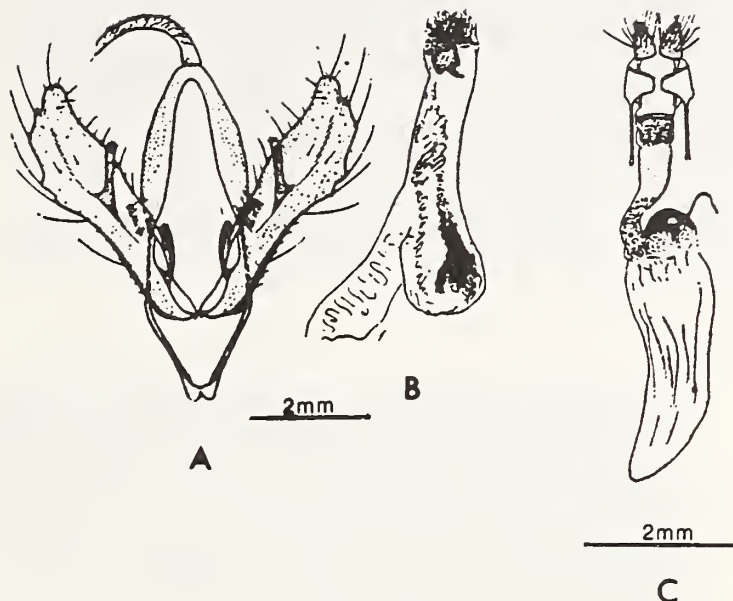
Wing about 20 mm from middle of thorax to apex of wing. Forewing (Fig. 1A) large, dorsally with median area purplish gray, marked with silver to gold (mostly silvery) Y shapes; subterminal line dentated with dark shades; orbicular and reniform spots oblique, constructed at middle; ventrally paler; Sc reaching costal margin about eight-elevenths length of wing (Fig. 1C); R1 arises from cell about seven-twelfths length of cell; R2 from end of accessory cell; R3 and R4 stalked about one-half way to margin, spaced distally; R5 connate basally

(Fig. 1)



Autographa gamma adults. A. Dorsal view (From Carter 1984).
B. Lateral view (From Vojnits 1969, photo by J. Bodor).
C. Wing venation (From Nazmi et al. 1984).

(Fig. 2)



Autographa gamma genitalia. A. Male, ventral view.
B. Aedeagus. C. Female (From Nazmi et al. 1984).

with stem of R3 + R4; M1 free; M2, M3, Cul proximated basally, spaced distally; Cu2 from cell about two-thirds length of cell; 2A complete and strong in normal pattern of group. Hindwing (Fig. 1A) with margin dark brown, veins covered with dark brown scales; Sc fused with R basally, reaching costal margin near apical end (Fig. 1C); R and M1 connate basally, divergent distally; M2 close to M3 basally, divergent distally; Cul from end of cell near M3 basally, spaced distally; Cu2 from cell about five-sixths length of cell; 2A and 3A complete.

Legs brownish, dappled with faint purplish scales on outer side, femur with long fine hairs; paler on inner side, hind tibia only with both pairs of spurs. Abdomen dorsally brownish gray, ventrally paler.

Male genitalia (Figs. 2A-B) with uncus well developed, hairy, curved with hook end; tegumen elongate, moderately broad; vinculum moderately narrow; saccus well developed, elongate; valves elongate and broad apically; costa moderately sclerotized; cucullus moderately broad without corona, but with moderately large setae; clasper attached to middle of valve far from clavus, elongate, fingerlike with 6 small setae apically; clavus rounded apically, setose; aedeagus large, vesica moderately chitinized with well sclerotized thornlike cornutus.

Female genitalia (Fig. 2C) with anal lobes moderate, triangular, clothed with long setae; anterior apophysis shorter than posterior apophysis; ostium moderate; colliculum large and well chitinized; ductus bursae moderately long, tubular, somewhat chitinized; corpus bursae large, elongate, entrance well chitinized; ductus seminalis near top of ductus bursae.

EGGS (Fig. 3) - Hemispherical, strongly and irregularly ribbed and reticulated, whitish, blue gray around micropyle (Carter 1984).

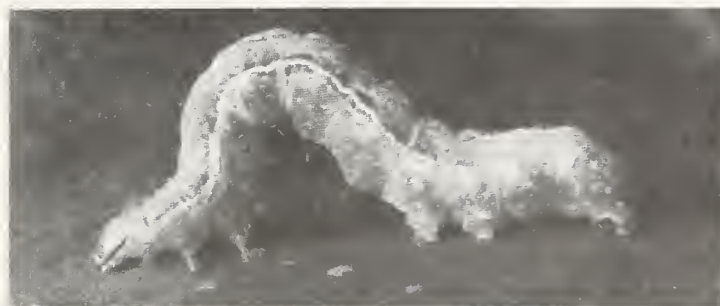
(Fig. 3)



Autographa gamma eggs scattered on upper leaf surface (From Vojnits 1969, photo by J. Bodor).

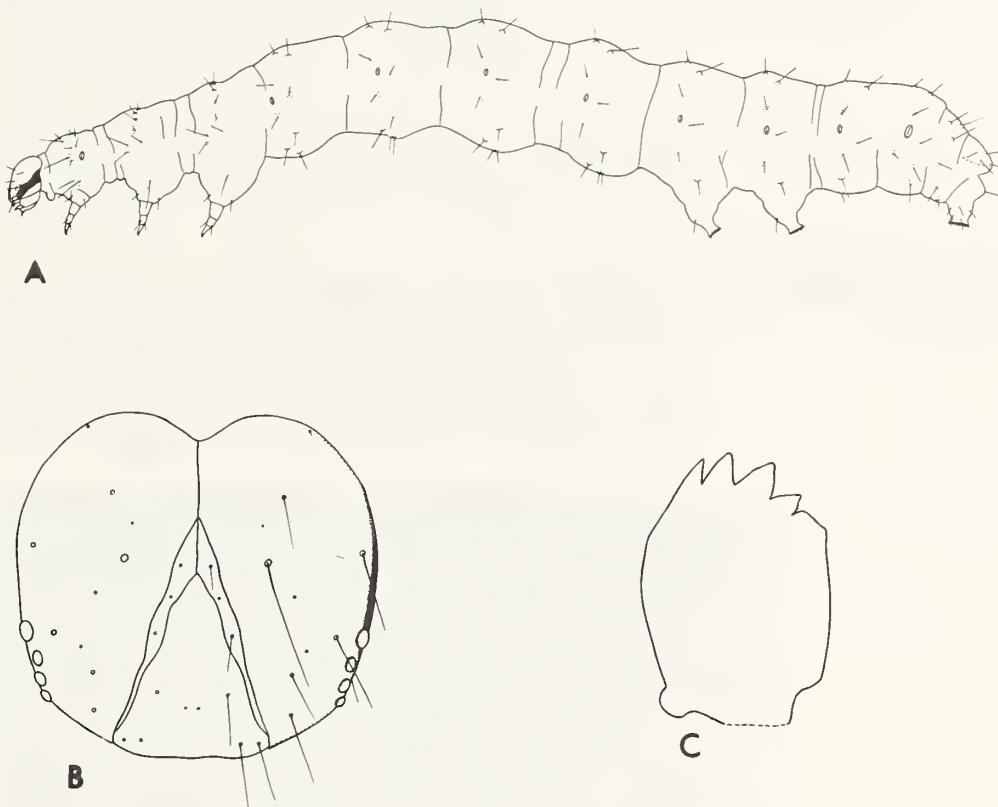
LARVAE (Figs. 4-5A) - Length variable, 30-40 mm (Emmett 1980). Head green; ocellar region often with conspicuous black streak extended posteriorly, black streak in dark specimens may form large blotch. Head and mandible as in Fig. 5 B-C. Body tapered towards head, yellowish green to greenish gray; dorsal line green bordered by sinuous, narrow, white lines; subdorsal line irregular, narrow, white; white or yellowish white band between subdorsal and dorsal marginal lines from mesothorax to abdominal segment 10; spiracular line white; spiracles white, peritreme narrow, dark green or black; pinacula white, slightly raised; prothoracic and anal plates concolorous with integument; thoracic legs greenish brown to black; prolegs on abdominal segments 5, 6, and 10 (Carter 1984).

(Fig. 4)



Autographa gamma larva, lateral view (From Vojnits 1969, photo by J. Bodor).

(Fig. 5)



Autographa gamma larva. A. Lateral view. B. Head, anterodorsal view. C. Left mandible (From Carter 1984).

PUPAE - Black, sometimes greenish; proboscis extending beyond wing tips; cremaster (Fig. 6) strongly developed, ridged, with 2 outward curved, spatulate spines, 6 terminally coiled setae (Carter 1984).

(Fig. 6)



Autographa gamma pupal cremaster, dorsal view (From Carter 1984).

Characteristic
Damage

On sugar beet, A. gamma destroys seed and leaves (Fig. 7). Larvae of the 1st and 2d instars eat one of the surface layers of a leaf, leaving intact the epidermis of the opposite side. The 3d instar larva makes holes through the center of the leaf, avoiding the veins. Marginal feeding is not usual. Older leaves are preferred. The larvae eat younger leaves only after

(Fig. 7)



Autographa gamma larval damage to leaf (From Vojnits 1969, photo by J. Bodor).

destroying the old ones. The center of the rosette of leaves and the leaf stalks are destroyed during epidemics (Novák 1975).

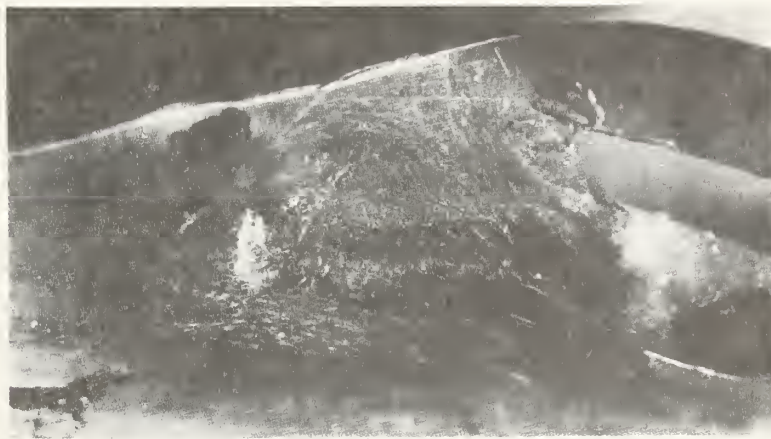
Detection
Notes

Members of the genus Autographa are almost always intercepted at U.S. ports of entry as larvae. These larvae are generally identified only to the generic level. Specimens identified as Autographa sp. have been intercepted about 50 times in the last 10 years from countries where A. gamma is known to occur. Many interceptions were from vegetables or cut flowers that are known hosts of A. gamma. The most common interceptions were on cut flower shipments from Europe and on vegetables (mainly Brassica spp. and Lactuca sativa) in ship's stores. The movement of its hosts into the United States is regulated under Title 7, Parts 319.37, 319.56, and 319.74 of the Code of Federal Regulations.

This species may be detected in the following ways.

1. Inspect for eggs on both sides of host leaves and on the underside of lower tobacco leaves.
2. Look for leaves with only one surface eaten or with holes in the blade but not on the margins or veins. Larvae readily drop from plants when disturbed.
3. Inspect the lower leaf surface for pupae (Fig. 8).

(Fig. 8)



Autographa gamma pupa in the cocoon (From Vojnits 1969, photo by J. Bodor).

For identification, submit suspect adult specimens, pinned and labeled. Preserve larvae and pupae in alcohol.

Biology

New adults need to feed on flower nectar to mature sexually. This requirement results in a migratory pattern for successive generations. As the vegetation dries in one region, the new adults fly to the next flowering region, feed, mature, and oviposit. Eggs hatch, and larvae complete their development and pupate. The vegetation dries, and new adults emerge and fly to the next region in flower to start the cycle again. The regions and their flowering times are as follows: southern shores of the Mediterranean and Black Seas during winter months ending in March at the latest; northern Mediterranean during March and April, ending in May; and central Europe from June and July into August in certain areas, ending in late fall (Vojnits 1969).

In Egypt, this species has four generations under laboratory conditions. The first is from February to March at 19° C, the second from April to May at 21° C, the third from May to June at 24° C, and the fourth in June at 28° C. Adults emerge during the night. Females emerge for 5-19 days; males for 3-9 days. Pairing takes place during the night. Adults mate after 2 days at 19.5° C, 1 day at 20.3° C, and after a few hours at 28° C.

A mated female oviposits after 2-3 days at 20° C, 1-2 days at 23° C, and 1 day or less at 27° C. At 20° C, one female lays 284-894 eggs, with an average of 514. In the field, eggs are laid singly (Harakly 1975) or in small, scattered batches (Carter 1984) on both sides of the leaves. On clover, eggs number no more than 4 per leaflet (Harakly 1975). In Yugoslavia, females lay eggs on the under side of lower tobacco leaves (Vasilev and Todorovski 1974). In Egypt, eggs hatch in 3-4 days from November through February and in May and June under average temperatures ranging between 19° and 27° C (Rashid et al. 1971).

A newly hatched larva wanders for about 35-55 minutes before feeding (Harakly 1975). In Yugoslavia, larvae begin to feed on the tip of tobacco leaves (Vasilev and Todorovski 1974). In Egypt, the last larval instar lasts longer than those of preceding instars (averaging 9 days at 20° C and 6 days at 28° C). Fifth instar larvae sometimes pass to a sixth instar. Duration of this instar is 2-4 days at 26° C and 4-6 days at 20° C.

The full-grown larva leaves or stays, and spins a loose cocoon (Fig. 8) covered by leaves (Harakly 1975). Larvae pupate on the lower leaf surface or in soil at a depth of 1 cm (Dochkova 1972). High temperatures tend to shorten the prepupal period. Means of prepupal periods are 3 days at 19° C, 9 days at 20° C, and 1 day at 25° C. At 22° C the pupal stage lasts for 10-12 days and averages 12 days. It lasts 8-10 days at an average of 27° C (Rashid et al. 1971).

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